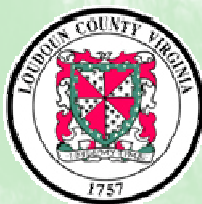


## LOUDOUN COUNTY

# Natural, Environmental, & Cultural Resources

Department of Building and Development



## **Loudoun County's Resources**

Abundant natural resources and a rich cultural heritage have defined Loudoun County's unique sense of place for more than 250 years. The mountainsides, forests, streams, vast stretches of agricultural land, and numerous historical sites are tangible assets that make the County an appealing place to live and work, while contributing directly and indirectly to Loudoun's economy.

For more than two centuries, agriculture was the dominant way of life in Loudoun County, which had a relatively constant population of about 20,000. That began to change in the early 1960s, when Dulles International Airport was built in the southeastern part of the County. The airport attracted new businesses, workers, and their families to the area. Still, until the mid to late 1980's much of Loudoun remained primarily an agricultural area. With the increase in development much of the fertile farmland is now gone. This change in the use of the land has had an impact on the natural and cultural resources of the County.



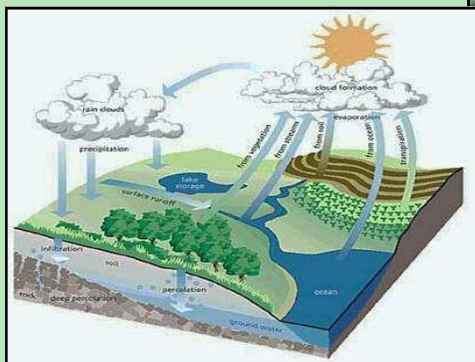
The following are narratives about natural, cultural, and environmental resources located in Loudoun County. Following the narratives is a section with related services and contact information for staff that can assist with questions or concerns in specific areas and facilitate sustainable growth with respect to these resources.

## **Water Resources**

Water resources – surface water, groundwater, and associated habitats – are critical to the environmental, recreational, and economic health of the County and its citizens. We rely on abundant supplies of clean, safe water for drinking, for use in agriculture, industry, and recreation, and to support natural ecosystems. Our water resources are all linked through the hydrologic cycle – the natural movement of water from the atmosphere to the land surface as precipitation that feeds our streams, lakes, wetlands, soils, and groundwater aquifers, and eventually returns back to the atmosphere by evaporation. Without abundant, clean water, the County’s economy and natural systems would be at risk.

### ***Surface Water:***

Most of Loudoun County’s 279,000 citizens are served by water obtained from surface water sources. Loudoun Water (formerly Loudoun County Sanitation Authority) provides water to over 175,000 residents in eastern Loudoun from two primary sources - Beaverdam Reservoir on Goose Creek and the Potomac River. The Town of Leesburg supplies over 37,000 residents with water from the Potomac River. In western Loudoun, the Town of Purcellville supplies water to about half of its population from the Hirst Reservoir situated in the headwaters of the Catoctin watershed.



## **Loudoun County's Resources (cont.)**

The land corridors that border and include rivers and streams comprise the County's largest natural ecosystem, consisting of nearly 500 miles of perennial streams. Where stream corridors have been preserved or reestablished to their natural condition, they help filter pollution from runoff, provide shade and keep stream water cool, detain flood waters and reduce their velocities, and provide food and habitat for fish and wildlife. Streams that drain 100 acres or more include regulatory floodplain areas which are important to manage wisely in order to protect property and public safety as well as maintain environmental benefits. The County's river and stream corridors include wetlands, riparian forests, steep slopes, and many of the County's important historic and archaeological sites.



They also provide many scenic, recreation, and educational opportunities. Recently opened parks along Goose Creek and the Potomac River provide more public access to the water, making it possible to fish or paddle long stretches of these waterways. Goose Creek and a portion of Catoctin Creek have been designated "Scenic Rivers" by the Commonwealth of Virginia which aids in establishing appropriate protection and management standards to maintain their scenic and environmental value.

### ***Wetlands:***

Wetlands are low-lying areas that are at least periodically saturated or inundated with water and have specific types of soils and vegetation consistent with these moist or wet conditions. Wetlands provide unique habitats that support a wide variety of wildlife and they provide wonderful opportunities for observing nature. Although wetlands are sometimes blamed for mosquito problems, a healthy wetland actually has a balanced relationship between mosquitoes and their predators which results in natural mosquito control. Wetlands serve a vital role in protecting surface water quality by filtering sediment, nutrients, metals, and other pollutants from stormwater runoff – in fact, sometimes they are equated to kidneys for their filtering capability.



Wetlands also help prevent erosion and flooding by acting as sponges that absorb and detain runoff as well as recharging groundwater. Historically, wetlands were often drained or filled to accommodate agriculture and urban development. Impacts to wetlands now require Federal and State permits and if the proposed impacts exceed established thresholds, they must be mitigated by creating new replacement wetlands. Even with these protections, there is an estimated annual loss of 13 acres of wetlands and 20,000 feet of streams within the County. Part of this net loss occurred because some of the wetlands that were established to replace those lost in Loudoun County were created in other counties. Federal and State law only requires that wetlands be replaced in the same large drainage area in which they were impacted and these large drainage areas often include multiple counties.

## **Loudoun County's Resources (cont.)**

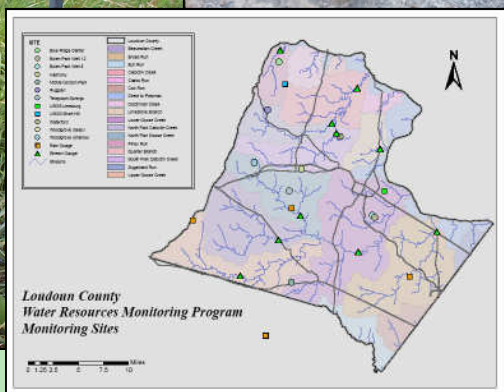
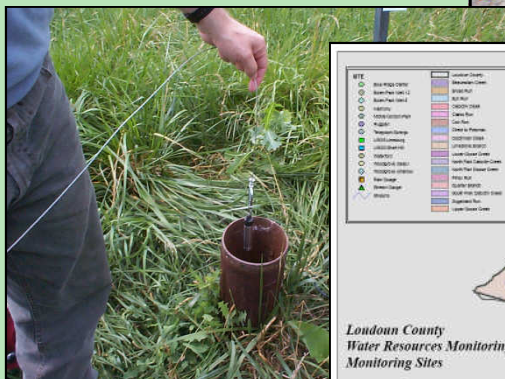
### ***Groundwater:***

Approximately 25 percent of the County's citizens, primarily those living in the western and northern portions of the County, depend on groundwater for their domestic water supply. Although community supply wells serve many residents in the various towns, villages, and some of the subdivisions, most of these residents rely on a private well located on their property. As the County's population continues to increase, protection of groundwater resources has become an increasingly important issue. Based on the County's available records, there are approximately 130 active community water supply wells and 14,500 active domestic water supply wells in Loudoun. There are additional wells that are used for other purposes such as crop and livestock irrigation, industry, schools, recreation, and monitoring.



The occurrence and availability of groundwater varies greatly within the County, due mostly to the complex geology below the surface. Solid bedrock occurs throughout the County at various depths beneath the overlying layer of soil. Within the bedrock are cracks and fractures that, below the water table, are saturated with groundwater. Groundwater pumped out of wells comes from these fractures, but the location and number of fractures is highly variable due to rock type and other factors so wells in different locations may yield very different amounts of water. Groundwater and surface water are inextricably linked - groundwater in aquifers is recharged by the normally slow infiltration of water from the surface, and a significant portion of the water in streams comes from the seepage of groundwater into the stream channel.

Compared to streams, water in the ground moves very slowly – often on the order of only a few inches or feet per day under natural conditions, although it can be much slower or faster in certain areas and situations. Because of this, groundwater levels respond relatively slowly to changes in precipitation and pumping. Groundwater that has become polluted can be quite difficult and time consuming to mitigate, therefore protection of groundwater resources is extremely important.

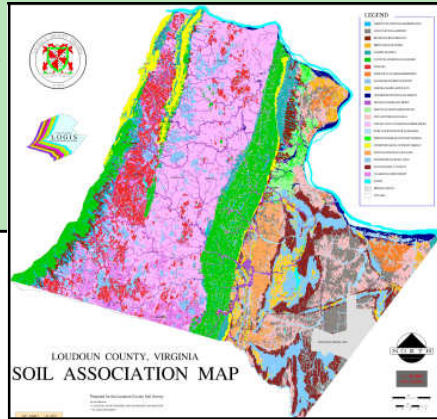
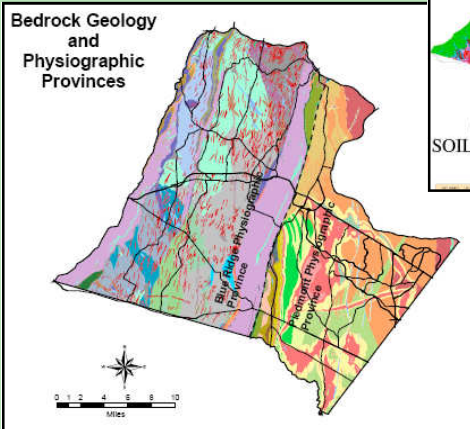


## Soils & Geologic Resources

Geologic rock formations are the skeleton and soils are the skin that make up Loudoun County. Both have a profound impact on our quality of life here in the County. Along with water and air, soil is one of the natural resources humans and wildlife cannot live without. Almost everything that we use or eat depends on soil in one way or another whether it is the food we eat or the foundation of our house. The eastern half of the County is located in the Piedmont physiographic province and the western half in the Blue Ridge physiographic province; the eastern foot-slopes of the Catoctin Ridge form the boundary line between the two. Topography varies significantly in Loudoun, with elevations ranging from 180' to 1900' above sea level. Major drainage systems include Broad Run, Goose Creek, Catoctin Creek, Bull Run, and numerous minor tributaries to the Potomac. All of these drainage systems are part of the Potomac River Basin.

## Loudoun County's Resources (cont.)

The geology map and the soil association map (below) show the very close relationship between soil and rock. This type of information along with many other sources are important tools used in predicting impacts land development proposals may have on erosion, water quality and quantity, failing slopes and sink hole collapse, as well as valuable insight to homeowner concerns and mitigating post-development problems.



### ***Prime Agricultural Soils:***

Prime agricultural soils account for approximately 19 percent of Loudoun County's soils, and are usually found in areas that are nearly level, well drained, and have plant available water. Loudoun's best agricultural soils are generally located in the Rural Policy Area. Because the County has emphasized the rural economy as an important part of its overall economic health, prime farmland and agricultural soils are especially valuable. Once this land-based resource is lost, it cannot be reclaimed. However, like other natural resources in the County, prime agricultural soils are being lost to residential development. This is because agricultural land is also well suited for development; being well drained, generally found on mildly sloping terrain, and with good drainfield potential. Soil erosion from development and improper soil management is becoming a significant threat to this non-renewable resource.

### ***Karst:***

An area of approximately 18,000 acres just east of the Catoclin Mountain range along the Route 15 corridor north of Leesburg is characterized as “karst terrain.” Karst terrain refers to areas where the underlying limestone and other carbonate rocks have been dissolved over time by mildly acidic precipitation, creating a landscape characterized by underground cavities, sinkholes, and springs. A sinkhole forms when an underground cavity increases in size until it is unable to support the overlying rock and soil and it collapses. The locations of these underground cavities can only be identified before they collapse through geotechnical and geophysical testing. In karst areas, surface water can flow directly into the groundwater system through sinkholes without the beneficial filtering normally provided by the slow percolation of water through soil. Consequently, groundwater in karst areas is more susceptible to pollution. Given the potential hazards of sinkholes and groundwater pollution in karst, land development performance standards, testing, and monitoring are important to help safeguard the public and the environment.



### ***Diabase:***

Diabase is a hard, brittle rock used as a base component for construction of roads and for building foundations. There are defined belts of this rock, also known as trap rock, south of Leesburg and near Washington Dulles International Airport. Soils with high shrink-swell characteristics often lie on top of diabase bedrock and can cause cracked foundations and severe structural damage to buildings.

## **Loudoun County's Resources (cont.)**

The crushed-stone quarries that extract diabase are a substantial economic resource. Loudoun County diabase is some of the best rock for concrete and road base material found on the East Coast. Continuing construction activities in the greater Washington area will ensure that diabase continues to be an important local economic resource. Quarrying operations and related activities in diabase resource areas present challenges to the environment and local residents due to the nature of heavy industrial activities and transport truck traffic.

### **Mountainside and Steep Slope Resources**

Steep slopes and moderately steep slopes occupy an area of approximately 50,000 acres in the County. Moderately steep slopes are areas with a 15 to 25 percent grade. Very steep slopes refer to more environmentally critical slopes of greater than 25 percent. If improper land use and disturbance occurs, these areas could experience erosion, building and/or road failure, and contribute to downstream flooding, as well as other health and safety hazards. For these reasons, the grade of a steep slope is often a factor of unstable soils. Development on steep slopes often requires high volumes of clearing and "cut and fill." Such earth moving is subject to erosion and sedimentation that causes adverse effects on surface water quality and aquatic habitat. The Steep Slope Standards of the Zoning Ordinance apply to all very steep and moderately steep slopes in the County.



The County's mountains and mountainside areas are geologically unique, contribute to its beauty and quality of life, and are valued by residents and visitors alike. Mountainsides are highly sensitive to land disturbance and development. In addition to the destruction of prime viewsheds, uncontrolled land disturbance within mountainside areas can cause major soil slippage (debris flows or landslides).

Disturbances that can initiate the failures include removal of trees and vegetation; cutting, filling, or blasting of the soil and bedrock; or altering the moisture level by excessive drawdown or increasing water runoff. The features of the mountainside create an environmental system that is unique to this region and that contributes to the scenic character of rural Loudoun County. Mountainsides contain the headwaters to many of the County's streams and are important groundwater recharge areas. They have unique flora and fauna communities and provide a variety of wildlife habitats.



The County manages development on the mountainsides through a Mountainside Development Overlay District (MDOD) that contains land use restrictions and performance standards to minimize the destruction of individual resources and the disturbance of the ecological balance of these resources. Misuse of these critical areas may result in health and safety hazards. The boundaries of the MDOD are based on a range of both technical and aesthetic factors.



## **Loudoun County's Resources (cont.)**

### **Forestry Resources**

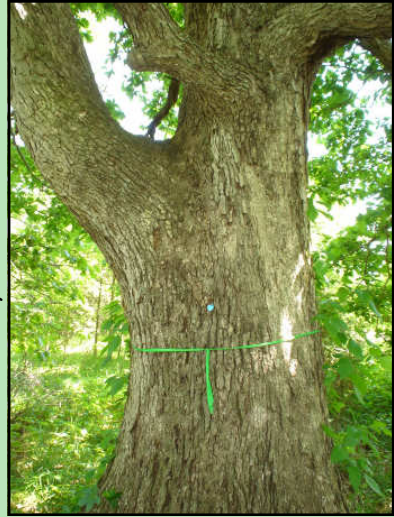
Loudoun County is fortunate to have some of the finest hardwood stands found anywhere in the Commonwealth. Products such as lumber and veneer help to stimulate a 23 billion dollar industry that employs 1 out of every 6 wage earners either directly or indirectly. Just over one third of Loudoun is in forest cover with the great majority of acreage found on the Blue Ridge, Short Hill, and Catoctin mountain ranges. This forest cover is protected to a large extent by the provisions found within the Mountainside Development Overlay District (MDOD). However, much of the forest cover in the eastern third of Loudoun has been lost to residential housing and commercial development, including Dulles Airport.



The County's forests and trees also improve air and water quality, offer important habitat for birds, small mammals, and other wildlife, and are excellent buffers between communities providing both visual screening and modest noise abatement. Forests and trees also provide micro-climate benefits in an urban setting, conserving energy by providing shade and evaporative cooling through transpiration. Additionally, they reduce wind speed and redirect airflow, reduce stormwater runoff and soil erosion, and increase real property values. Maintaining canopy in critical environmental locations, such as steep slopes and along stream

corridors, is of paramount importance in the urban environment where significant environmental impacts and alteration occur. Riparian forests along streams and waterways provide the greatest single protection of water quality by filtering both surface and sub-surface pollutants and impurities from stormwater runoff, decreasing stream bank erosion, and maintaining the physical, chemical, and biological integrity of the stream environment. This includes the dissipation of energy during storm events, reduced water temperatures that expand the richness of aquatic life, and providing wildlife corridors that are critical habitat in a fragmented urban environment.

Loudoun County's Zoning Ordinance requires that forest and tree cover be preserved in amounts proportionate to building density. This includes the preservation of natural canopy, in some cases, to meet buffer requirements as well as overall canopy requirements. With the current rate of development and subsequent impact on the urban forest, additional measures will be required in the future to preserve this vital natural resource. On average, 5 acres of forest cover per day have been lost in recent years due to development. Staff plans to accurately map and monitor the forest cover in the County and that information will need to be woven closely with existing State and Federal mandates to maximize opportunities to preserve forest resources.



Our forest resources must be monitored and protected from the impact of insect and disease damage. Gypsy Moth is perhaps the single greatest threat to these resources; having previously lead to widespread spraying and in some cases stand mortality.



## **Loudoun County's Resources (cont.)**

### **Wildlife Resources**

Plants and animals play an important role in nature's lifecycle and its ecosystems. For wildlife habitats, large, contiguous parcels of natural open space are preferable to more numerous, smaller, disconnected areas.

While many high-quality plant and animal habitats have already been lost or altered due to land development, the County still has a number of unique and natural habitat areas. The largest contiguous areas of forest and naturally vegetated land are on mountainsides and along stream corridors. These areas play a key role in preserving the abundance and diversity of the County's remaining plants and wildlife. They are also a part of the Blue Ridge ecosystem, a 550-mile, contiguous natural area of parks, national forests, Federal wilderness, and the Appalachian Trail that extends from Georgia to Pennsylvania.



An integrated Green Infrastructure approach helps to prevent habitat fragmentation, while enhancing ecological connections with larger natural areas. The County strives to protect, preserve, and create large-scale plant and wildlife habitats that overlap with other important resources within the County's Green Infrastructure.

The County protects habitat for rare, threatened, and endangered plant and animal species in accordance with the Federal Endangered Species Act. The health and survivability of plants and animals can often foretell future environmental threats to human life and health. Therefore, the County encourages the study of the biological processes within the natural resource elements of the Green Infrastructure.



## **Cultural Resources**

The County has an unusually high number of historic and prehistoric sites that, along with scenic resources, farms, and open spaces, are major components of its unique rural character and economy. Over 4,350 historic structures and sites and over 1,500 archaeological sites have been surveyed and mapped, and there is potential for identifying many more. These heritage structures and sites comprise a valuable resource that has enormous cultural, aesthetic, and economic value to the residents of the County. Along with the rural landscape in which they are set, historic sites represent the County's largest tourist attraction. The preservation of Loudoun's heritage and cultural history is one of the great benefits for present and future citizens.

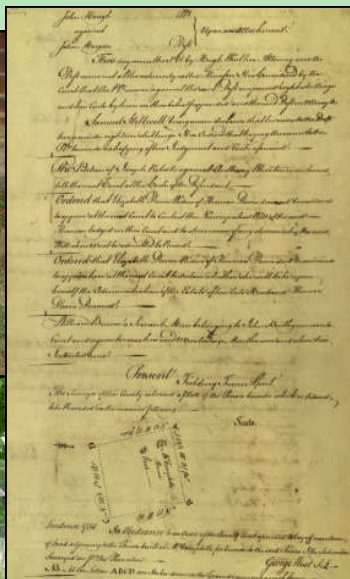


The archaeological sites that are currently mapped are mostly prehistoric Native American sites, some of which date to circa 8,000 BC. Most of the previously identified sites are in the eastern part of Loudoun where there have been impacts associated with new development, particularly to those sites located outside floodplains. These sites represent an important link to the County's past, and every effort should be made to discover and map them before they are lost to development. Many more sites are likely to be identified in other parts of the County as development expands.

## Loudoun County's Resources (cont.)

Loudoun County was one of the first jurisdictions in the United States to adopt rural historic districts when the first Aldie, Waterford, and Oatlands districts were adopted in 1972, followed by the 10,000-acre (currently 6,900 acres) Goose Creek District in 1977. There are now seven County-administered districts, including Aldie, Beaverdam Creek, Bluemont, Goose Creek, Oatlands, Taylorstown, and Waterford. In addition, Beaverdam Creek has a roadway buffer area intended to preserve rural character and landscape quality. The County has 49 sites that are on both the Virginia Historic Landmarks Register and the National Register of Historic Places. There are also five National Historic Landmarks in the County; including Balls Bluff Battlefield, Dodona Manor, Oatlands Plantation, Oak Hill, and Waterford.

Protection for some of the County's historic structures comes from design guidelines contained in the Zoning Ordinance, but the ordinance protects only the designated County-administered historic districts. State and national designations are primarily honorary.



While ideas about what is scenic may vary, people generally agree on what areas and places are the most visually appealing. These areas and places often include many of the same resources (or combinations of resources) that are addressed as part of the County's Green Infrastructure. Often, significant scenic resources coexist with historic structures or are a part of a mountainside area, stream valley, or other natural setting. Scenic views are often associated with the roads, highways, rivers, and streams from which they are most often enjoyed; as well as with agricultural lands, mountainsides, and other features that make up these vistas. Loudoun's rural roads, agricultural fields, hedgerows, crop fields, farmhouses, barns, crossroad churches, and villages all contribute to the scenic areas and corridors in the County.



Waterford 1930's



The state has designated Routes 15, 665, 662, 673, 681, 690, 704, 719, 722, 728, 731, 734, and a portion of Route 7 (Colonial Highway, from Route 699 to Route 287, approved February 2001), as Virginia Byways. Likewise, Catoctin Creek and Goose Creek have been designated as State Scenic Rivers; and the County has designated historic and mountainside districts and river and stream corridor buffers that protect elements of the scenic landscape and critical cultural and natural resources.



Leesburg Early 20th Century

## **Loudoun County's Resources (cont.)**

### **Preservation and Conservation Resources**

#### ***Revised General Plan:***

Adopted in 2001, the Revised Comprehensive Plan, which includes the General Plan and Countywide Transportation Plan, came after a year-and-a-half of extensive study and public input, including community meetings, public hearings, and public comment. The goals include preserving environmental and historical features. The integrated Green Infrastructure strategy is based on three goals:

- Conservation – Creating a stronger relationship between natural and built environments.
- Preservation – Retaining and protecting existing environmental, natural, and heritage resources.
- Restoration – Adding to the Green Infrastructure wherever possible.

#### ***Ag and Forest Districts:***

The Agricultural District Advisory Committee (ADAC) is appointed by the Board of Supervisors and consists of four landowners engaged in agricultural or forestal production. The ADAC makes recommendations to the Planning Commission regarding new agricultural districts, renewal of existing districts, additions to districts and withdrawals from districts. This committee renders expert advice as to the nature of farming and forestry and agricultural and forestal resources within the district and their relation to the entire locality.

#### ***Water Resources Technical Advisory Committee:***

The Water Resources Technical Advisory Committee was first created by the Board of Supervisors in April 2001 to advise the Board on matters related to water resources in the County. The committee provides a quality control function for the County's groundwater quality and quantity; surface water quality, quantity, and habitat; watershed management; flood control; and stormwater management programs from both the local and regional perspective.

***Rural Policy Area Zoning:***

Adopted in December 2006, the zoning amendments support the development of the rural economy and a variety of residential development options including conventional subdivision, spin-off lots and rural clusters. The Rural Policy Area encompasses 227,904 acres, representing about 67 percent of Loudoun County's total land. The amendments offer several subdivision options to enable preservation of open space.

***Conservation Easements:***

In Loudoun County, 2,087 acres were preserved in 2007 bringing the grand total to more than 42,000 acres of privately conserved land in the County. This represents almost 13% on the County. Rural land conservation is critical to preserving a sufficient supply of the land and water that is needed for farming. Protecting the integrity of the rural landscape also preserves essential historic resources, provides vital habitat for wildlife, and safeguards scenic views and recreation opportunities.

***Watershed Management Planning:***

The Loudoun Strategy for Watershed Management Solutions (SWMS) project was a collaborative effort to coordinate existing watershed efforts and define a shared vision for watershed activities across Loudoun County. Following four stakeholder meetings, a "Declaration of Cooperation" was included in the December 2006 report.

In 2007, the Loudoun Watershed Management Stakeholders Steering Committee was formed as one of the recommendations of the SWMS project to continue the collaborative involvement of County stakeholders in the watershed planning and implementation process.

## **Loudoun's Environmental Teams**

### **Natural Resource Team**

The Natural Resources Team (NRT) is a diverse team of certified professionals offering expertise in a variety of fields. This team provides specialized services both in the office and in the field to public officials, the general public, the private sector, and other staff. NRT Programs include: mapping and monitoring of natural resources such as soils, geology, wetlands, and natural drainage patterns; locational clearance reviews to protect the health and welfare of the public as well as protection of the natural resources; geotechnical study review; and review and/or preparation of forestry plans. This team is also responsible for administering the Mountainside Development Overlay District (MDOD) and the Steep Slope Standards of the Zoning Ordinance.

The members of this team are the most requested by the public to answer questions and concerns regarding a vast array of environmental issues. Involvement in various grants, elementary and secondary education (including Standards of Learning), and community events are additional tasks in which this team actively participates.



## ***Forestry***

The County Forester serves as the sole resource to the County for any forestry or tree related issues. Review of tree conservation plans and forest management plans, field visits, complaint response, and updates to the County's mapped forest cover are all covered by this program. This position also monitors tree health related to insect (Gypsy Moth) and disease damage.

## ***Soils***

The continued maintenance and updating of the County's mapped soils information has produced some of the nation's best digital soils data. The County Soil Scientists provide plan review and field review of proposed development across the County. The Soil Scientists serve as technical experts to the Zoning Administrator and County Attorney, as well as arbitrators to the County's Environmental Health Department and the Virginia Department of Health.



## ***Locational Clearances***

The Natural Resource team is charged with administering the Locational Clearance program designed to ensure that development applications conform to the health, safety, and environmental standards set forth in the Zoning Ordinance. These areas include the Mountainside Development Overlay District (MDOD) and Steep Slopes. Staff also provides technical guidance pertaining to development on karst terrain.

## **Loudoun's Environmental Teams**

### ***Geotechnical Engineering***

The County Geotechnical Engineer provides review and guidance to the general public seeking to build or alter the terrain, to staff in the Department's Engineering Division, and Building Officials. Continuing efforts are being made to coordinate with other jurisdictions on regulation and policy revisions to yield better building standards and safer structures. The Geotechnical Engineer also provides an expert opinion on problematic and sensitive issues regarding health and safety related to soils and building structural integrity.



### **Environmental Review Team**

The Environmental Review Team (ERT) comments on environmental issues related to "by right" property subdivisions and for land use applications that are considered by the Board of Supervisors. The team focuses primarily on habitat protection for wetlands and other areas that support endangered and threatened species, forest preservation and reforestation, qualitative analysis of proposed stormwater treatment measures, protection of landscapes with steep slopes and sensitive mountainsides, encouragement of green building design, analysis of archaeological resources, and proper measures to minimize ambient noise generated by road traffic for new developments.

The case-by-case focus on these issues has cultivated an expertise within the team that enables constructive outreach with other government agencies, commissions, non-profit organizations, and businesses involved with these issues. The team meets regularly with the Army Corps of

Engineers and the Virginia Department of Environmental Quality (DEQ) to compare wetland permit application requests with County land development applications to ensure consistency. The team has also facilitated a large increase in approved wetland and stream mitigation banks located within Loudoun County to compensate for habitat lost elsewhere in the County due to development. Team members also represent the County when regional agencies like the Northern Virginia Regional Commission or Metropolitan Washington Council of Governments undertake environmental initiatives, such as low-impact development (LID) and green building. Team members also assist local heritage preservation groups with archaeological resource "road shows" that connect the public to the County's heritage.



### **Erosion and Sediment Control Team**

Erosion is an ecological process constantly occurring on Loudoun County's 333,498 acres. Serious problems may develop when erosion happens at an unnatural pace due to clearing and grading of the land. The typical construction site erodes at a rate 200 times greater than erosion from cropland and 2,000 times greater than erosion from woodland. Sediment from erosion can affect our drinking water and increase pathogen growth in our waterways. Sediment can clog storm drainage systems and have a negative impact on stormwater ponds as well as on the aesthetics and real value of land.

## **Loudoun's Environmental Teams**

The Erosion and Sediment Control Team's (E&S) primary responsibility is to minimize the degradation of properties, stream channels, waters, and natural resources by establishing requirements for the control of erosion, sediment deposition, and stormwater runoff and to administer and enforce procedures for the health, safety, and general welfare of our citizens.

The E&S Team works to ensure compliance with all aspects of the Virginia Erosion and Sediment Control Law as well as the County codified ordinances that pertain to the same. This includes involvement in all phases of a project, beginning with initial plan review and the processing of grading permits, continuing with regular on-site field inspections, and finishing with the E&S Bond Release Inspection process.



The Loudoun County E&S Control Program has been determined by the Virginia Department of Conservation & Recreation to be fully consistent with the requirements of the Virginia Erosion and Sediment Control Law and Regulations, thereby providing better protection for Virginia's soil and water resources.

## **Water Resources Team**

The Water Resources Team works on issues associated with the quantity and quality of surface water and groundwater in the County. These issues include evaluating land development proposals for stormwater management and floodplain management, and reviewing hydrogeologic (groundwater) studies to assure that development meets the requirements of the County's Zoning Ordinances and Facilities Standards Manual. In addition, the team is managing programs to monitor water resources in the County and performing watershed management planning. As part of these efforts, staff of the Water Resources Team regularly work with several committees including the Water Resources Technical Advisory Committee, the Facilities Standards Manual Review Committee (both appointed by the Board of Supervisors), and an independent citizen stakeholder steering committee focusing on watershed management issues. The basic goals of these efforts are to help protect life, property, and natural resources, and to help assure that there is adequate clean and safe water in the County to support both human and environmental needs.



### ***Stormwater and Floodplain Management***

Land development applications are evaluated for consistency with applicable Local, State, and Federal standards for both stormwater management and floodplain management. Development plans are reviewed for stormwater issues which include the proper implementation of structural and vegetative best management practices (BMP's) to prevent non-point source pollution from exceeding pre-development levels. These BMP's, which include rain gardens, wet ponds, inlet filters, and constructed wetlands, control erosion, prevent drainage problems and property damage, and minimize negative impacts to streams.

## **Loudoun's Environmental Teams**

Floodplain study and floodplain alteration applications associated with development are reviewed to maintain the County's status as a participating community in FEMA's National Flood Insurance Program (NFIP). Because of Loudoun County's stringent floodplain policies and ordinances, the vast majority of County residents are not required to purchase flood insurance, and the few that do need this insurance can obtain reduced premiums. Moreover, the environmentally beneficial buffering effect and aesthetics of the floodplains are maintained.

### ***Hydrogeologic Studies***

Hydrogeologic study reports are submitted to support land development proposals in the County involving relatively large withdrawals of groundwater or, more commonly, for subdivision proposals of 10 or more lots if groundwater from the site will supply the potable water for the subdivision. The reports, which include geologic and groundwater data collected from the drilling and testing of wells on the property, are reviewed by staff to determine if the hydrogeologic system can support the proposed use. Information collected for these studies provides scientists (from both the County and other organizations) with information to help improve the overall understanding of the complex hydrogeologic conditions in the County for resource development and management purposes.

### ***Monitoring and Watershed Planning***

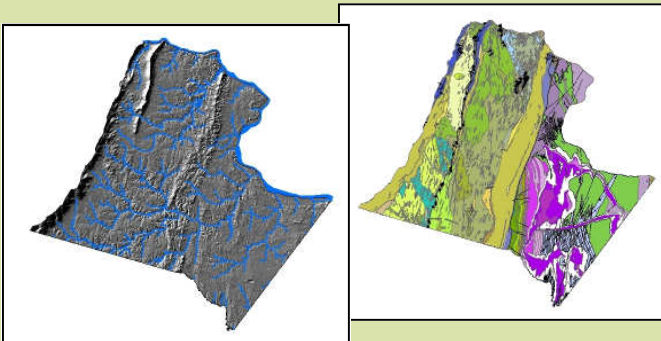
Team staff are responsible for developing a monitoring program to track precipitation and the quantity and quality of surface water and groundwater in the County. Currently, monitoring sites include 10 surface water stream gauges, 11 groundwater monitoring wells (with more planned), and 2 rain gauges. Data are also obtained from additional sources (including nearly 16,000 well construction permits from Health Department files and approximately 5,000 DEQ stream water quality samples) and are included in an integrated water resources database developed by staff. Accumulating and organizing this large amount of data will help the County better understand water resources and protect them by identifying potential problems before

they become critical. To help promote long-term protection and wise use of water resources, a Countywide watershed management plan is under development that will help integrate existing County water-related initiatives and guide future watershed planning and management efforts. Both the monitoring and watershed planning programs are partially funded by grants from the U.S. Environmental Protection Agency.

## GIS

Loudoun County's Geographic Information System (GIS) has increasingly become an important tool for staff during the development review process. The Department of Building and Development (B&D) has taken an active approach in training department staff in the use of GIS which has resulted in both a better understanding and expanded use of GIS. Staff generated maps now include aerial photography overlaid by numerous environmental layers such as soils, drains, wetlands, topography, steep slopes, forest cover, Floodplain Overlay District, and the Mountainside Development Overlay District. The GIS assists staff in evaluating a project for conformance with the County's environmental regulations and policies and allows staff to make appropriate comments and recommendations. The GIS was utilized in developing a predictive model for jurisdictional waters and wetlands within the County. A similar model for cultural resources is planned for the future. B&D will continue to incorporate advances in technology such as Global Positioning Systems (GPS) and mobile GIS as we strive to improve on the services we provide.

The Loudoun County Predictive Wetlands Model, a GIS layer developed by County environmental staff, estimates the likely presence of wetlands based on factors such as soils, hydrology, and slope. The model estimates that there are approximately 27,000 acres of wetlands, comprising 8% of Loudoun County.



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